

A Field Reconfigurable Manipulator for Rovers, Phase II

Completed Technology Project (2008 - 2010)



Project Introduction

Robotic systems will be deeply integrated into future human exploration of the lunar surface. Prior to human arrival, they will conduct scientific investigations, explore potential habitation sites, prepare infrastructure, and construct the necessary facilities for human occupation and activity. When humans are present, robotic systems will assist and support them in the various activities of exploration and habitation. Given the great cost of developing such systems, transporting them to the Moon, and maintaining them there, NASA must ensure that the robots it sends are capable of many different tasks. This will enable a smaller number of robots to accomplish the necessary tasks while providing better redundancy in case of subsystem failure. We propose to build an innovative manipulation system that includes a modular dexterous manipulator for various mobile platforms and a software control system that seamlessly coordinates motion control of rover and manipulator. The manipulation system will be JAUS-compliant, enabling many existing technologies to easily interface with it. The proposed innovation has two main components. The primary component is a lightweight, low-power manipulation system for mobile platforms. The manipulator itself will be swiftly reconfigurable with up to seven degrees of freedom (DOF). There will be several different tools available for use at the end effector: some passive, some active. All associated electronics will be internal to the manipulator, requiring only power and data connections externally. Connections between modules will use the innovative "Universal Mating Adapter". The second innovative component is a software control system that coordinates control of the vehicle and manipulator. Such coordination extends the robot's dexterous workspace and facilitates teleoperation by providing the operator with a unified interface.



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission
Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

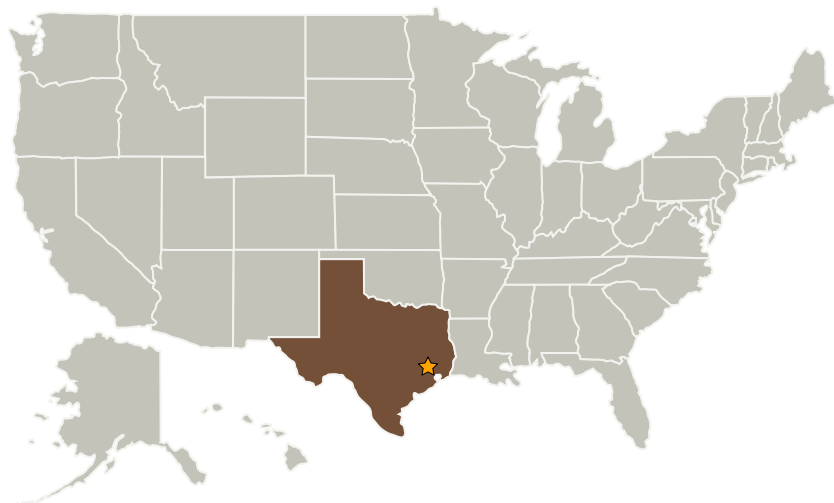
Small Business Innovation
Research/Small Business Tech
Transfer

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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
TRAC Labs, Inc.	Supporting Organization	Industry	Webster, Texas

Primary U.S. Work Locations

Texas

Project Transitions

**January 2008:** Project Start**January 2010:** Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX04 Robotic Systems
 - └ TX04.3 Manipulation
 - └ TX04.3.1 Dexterous Manipulation